Remarks:

Applicant has carefully studied the non-final Examiner's Action mailed December 7, 2004, having a shortened statutory period for response set to expire March 7, 2005, and all references cited therein. The amendment appearing above and these explanatory remarks are believed to be fully responsive to the Action. Accordingly, this important patent application is now believed to be in condition for allowance.

Applicant responds to the outstanding Action by centered headings and numbered paragraphs that correspond to the centered headings and paragraph numbering employed by the Office, to ensure full response on the merits to each finding of the Office.

1. Applicant acknowledges the Office's recitation of the claim of benefit.

Oath/Declaration

2. Applicant acknowledges the Office's finding that the Declaration filed 10/13/2004 is acceptable.

Specification

3. Applicant has proof-read the specification and corrections thereto begin on page 2 of this paper.

Drawings

4. The drawings stand objected to because reference numerals [1]-[9] in Figs. 1 and 2 are not mentioned in the description. The specification is amended herewith to bring it into conformity with said Figs. 1 and 2.

Claim Rejections – 35 USC § 103

Applicant acknowledges the quotation of 35 U.S.C. § 103(a).

5. Claims 1, 5-6, and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Rupp et al. in view of Ioku et al. Reconsideration and withdrawal of this ground of rejection as it relates to claims 5-6 is requested because claim 1, currently amended, now includes the allowable subject matter of canceled claim 2. Claims 5-6 depend from allowable claim 1. Reconsideration and withdrawal of this ground of rejection as it relates to new claim 9 is requested because said new claim 9 includes the allowable subject matter of claims 1, 5 and 6.

Rupp discloses chemical vapor deposition (CVD) to form a single crystal thin film that has a structure identical to the structure of the substrate (SiC). Therefore, no insulating film is

formed. Applicant's method, on the other hand, as recited in the preamble, forms an insulating thin film (silicon oxide being glass).

Moreover, Ioku, like Rupp, also teaches the formation of silicon carbide substrates by a CVD process. Specifically, Ioku employs a silicon wafer as a sacrificial nucleation substrate for the deposition of single crystal silicon carbide. Ioku does not address the formation of an insulating thin film on the silicon carbide substrates formed by the Ioku process. Ioku teaches the removal of vaporized silicon at low pressure by employing radio frequency inductive heating to heat a susceptor material; no oxide or other insulator material is formed.

Claim as amended thus patentably defines over the aggregation of Rupp and Ioku because both references teach away from the formation of an insulating film.

6. Claims 7-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Rupp in view of Ioku and further in view of Su et al. (hereinafter "Su"). Cancellation of claim 8 has rendered moot this ground of rejection as it relates to said claim 8. Reconsideration and withdrawal of this ground of rejection as it relates to claim 7 is requested because claim 7 ultimately depends from claim 1, currently amended.

7. Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Rupp and Ioku in view of Marcus et al. (hereinafter "Marcus.") Claim 4 depends from claim 1 as currently amended and therefore is in condition for allowance as a matter of law.

The Office cites Marcus to support the proposition that it was known to select an oxidizing gas from the group of gases consisting of molecular oxygen, excited molecular oxygen (singlet delta g state), and nitrogen oxides. However, Marcus neither teaches nor suggests that such gases, when excited, have utility in the formation of a thin film of silicon oxide as taught by Applicant. Instead, Marcus teaches the formation of an oxide thin film on silicon to encapsulate the silicon to prevent escape of dopant material therefrom during a conventional activation process that reduces the resistivity of the silicon by incorporating implanted dopant ions into the silicon crystal lattice.

Neely, in U.S. patent No. 5,443,863, cited by Applicant, teaches the formation of oxide on silicon and silicon carbide at low temperature, However, Neely teaches that film growth rate sharply decreases as the distance increases between a microwave source exit and the substrates being oxidized. Thus, Neely discloses an optimal distance of six millimeters (6mm) (about one-quarter inch). Significantly, Neely teaches that half of the candidate species (atomic oxygen in an

excited state) to effect film growth or oxide formation on silicon carbide remains at said distance, thereby implying that said candidate species would be completely consumed at a distance of about 12mm or half an inch. Applicant does not rely upon the teachings and suggestions of Neely because Applicant's distance is about a meter, which is almost 170 times greater than the Neely distance. The specification as filed includes no express mention of this one meter distance, and patent drawings are not to scale, but a casual inspection of Fig. 1 indicates that the distance far exceeds 6mm. No claim is drawn to such distance because no recital of such distance is required to define over the Neely and the other references. (Physical limitations of the invention prevent distances smaller than feet. The specification as filed refers to blocking light—implying a bend in the apparatus. The tube must be of a suitable physical size. Neutrality of the afterglow species as noted in the specification means that the samples cannot be placed in the plasma zone directly or too close thereto, as taught by Neely. The introduction of the secondary port requires some space between the source and the furnace 1) to accommodate the fittings and 2) to enable the reaction between the afterglow species and the secondary gas to be completed before the products get to the substrates. Such distances are macro distances, *i.e.*, not on the order of a few millimeters as taught by Neely. The furnace has a temperature profile that is flat near the center and tails off to the ends. The tailing off is required to maintain the flat zone in the center such that production quantities of samples may all be processed to produce the same film thickness. The thickness of oxide obtained is related to the concentration and type of reactive gasses interacting with the surface of the substrate and is strongly related to the temperature of the substrate hence the entire batch of wafers must be at the same temperature. This cannot be accomplished within a space of just a few inches.

Allowable Subject Matter

8. Claim 10 stands allowed. It is amended herewith to avoid inferential claiming and to place it into more standard form. No new matter is introduced into the claim by the amendment.

Claims 2-3 stand objected to as being dependent upon a rejected base claim. Both of said claims are therefore canceled. The limitations of claim 2 are added to the limitations of claim 1. The limitations of claims 1 and 3 are recited in new claim 11. New claims 12-16 depend from new claim 11 and correspond to original dependent claims 4-8. The limitations of claims 2 and 3 are not added to claim 1 because a microwave cavity as recited in claim 3 is part of an afterglow thermal reactor as recited in claim 2. Claim 1 would be rendered ambiguous if it recited that the

electric field is created by an afterglow thermal reactor and by a microwave cavity. More particularly, an afterglow thermal reactor includes a microwave source, a furnace, and the quartzware that sits in each and runs between the two as shown in Fig. 1. (The quartzware includes an approximately two inch diameter piece that traverses the cavity, has a pigtail on the furnace side of the cavity at a ninety degree (90°) bend and a vacuum ball joint cup seal which connects to the ball joint on the end of the tube, also about two inches in diameter, that enters the furnace and expands to about six inches in the furnace, proceeds to the other end of the furnace and is terminated with a flange for the load port seal and a side port for the connection with the pump.)

Applicant agrees that the art made of record and not relied upon is not more pertinent to the claimed invention than the art cited.

Conclusion

9. Applicant acknowledges the contact information for the examiner in charge of this patent application.

10. Applicant acknowledges the contact information for the supervisor of the examiner in charge of this patent application.

11. Applicant acknowledges the contact information for inquiries of a general nature or relating to the status of this patent application.

If the Office is not fully persuaded as to the merits of Applicant's position, or if an Examiner's Amendment would place the pending claims in condition for allowance, a telephone call to the undersigned at (727) 507-8558 is requested. Applicant thanks the Office for its careful examination of this important patent application.

Very respectfully,

SMITH & HOPEN

By: _____

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Dated: March 7, 2005

pc: University of South Florida
Andrew M. Hoff, Ph.D.

CERTIFICATE OF FACSIMILE TRANSMISSION
(37 C.F.R. 1.8(a))

I HEREBY CERTIFY that this Amendment A, including Introductory Comments, Amendments to the Specification, Amendments to the Claims, and Remarks, is being transmitted by facsimile to the United States Patent and Trademark Office, Art Unit 2818, Attn: Phuc T. Dang, (703) 872-9318 on March 7, 2005.

Dated: March 7, 2005

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Deborah Preza